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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/405,176	09/24/1999	HIROYUKI SHINBATA	35.C13853	9205

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EXAMINER

KIM, CHONG R

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 01/23/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/405,176

Applicant(s)

SHINBATA, HIROYUKI

Examiner

Charles Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 16, 19 and 34-40 is/are pending in the application.
- 4a) Of the above claim(s) 35-37, 39 and 40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 16, 19, 34, 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

Species A, claims 1-7, 16, 19, 34, 38

Species B, claims 35-37, 39-40

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to

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be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. Newly submitted claims 35-37, 39-40 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: they belong to a different species.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 35-37, 39-40 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Response to Amendment and Arguments

3. Applicant's amendment filed on November 3, 2003 has been entered and made of record.

4. Applicant's arguments with respect to claims 1, 16, 19 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

The following quotation of 37 CFR § 1.75(d)(1) is the basis of objection:

(d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. (See § 1.58(a)).

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5. Claim 2-4 are objected to under 37 CFR § 1.75(d)(1) as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery.

Referring to claim 2, the phrase “the projection of the binarized object image” in line 3 lacks antecedent basis. It appears that the applicant intended the phrase to read “a projection of the binarized object image”. Appropriate correction is required.

Referring to claim 3, the phrase “the projection of the weighted image” in line 4 lacks antecedent basis. It appears that the applicant intended the phrase to read “a projection of the weighted image”. A similar objection is applicable to claim 4. Appropriate corrections are required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claim 34, the phrase “pixels within a certain distance from the pixels” in line 5 renders the claim indefinite because it is unclear what is being claimed. More specifically, it is unclear which pixels the second instance of “pixels” are referring to.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2, 6, 7, 16, 19, 34, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kido et al., U.S. Patent No. 5,732,149 ("Kido") and Jang et al., U.S. Patent No. 5,268,967 ("Jang").

Referring to claim 1, Kido discloses a method for setting an area in a radiation image comprising:

a. discriminating step, of discriminating, in the radiation image, an area, as a passing-through area (col. 2, lines 18-19. Kido explains that the irradiation field region of the image is extracted from the image. The Examiner notes that the remaining non-extracted area of the image is interpreted as the passing-through area.)

b. an object discriminating step, of discriminating an area obtained by eliminating the area discriminated as the passing-through area in the discriminating step from the radiation image, as an object image [col. 2, lines 18-19. Kido explains that the irradiation field region is extracted from the image, thereby eliminating the remaining area in the image. What remains is the irradiation field region from which he performs further processing. For example, Kido explains that the processing is performed in the extracted irradiation field region of the image, the number of pixels which has been reduced (col. 12, lines 23-27). The Examiner notes that

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reducing the number of pixels is interpreted as being analogous to eliminating the non-extracted (passing-through) area of the image.]

c. a calculating step, of calculating a projection from the object image discriminated in the object discriminating step [col. 2, lines 18-22. Kido explains that the irradiation field region is extracted from the image (thereby eliminating the remaining area) as noted above, and the concerned region detection is performed only on the extracted irradiation field image data (the object image obtained in the object discriminating step) (col. 2, lines 18-22). The concerned region detection is performed using the local maximum and local minimum in the projection of the longitudinal and lateral directions (col. 1, line 65-col. 2, line 1). Therefore, the “projection of the longitudinal and lateral directions” is a projection of the image data in the extracted irradiation field image region (the object image)]

d. a setting step, of setting an area in the radiation image based on the projection (col. 1, line 65-col. 2, line 3). Kido explains that the area (concerned region) is set using the local maximum and local minimum in the projection of the image.

Kido fails to explicitly disclose that the passing-through area of the image is an area where the X-rays are directly irradiated on an X-ray detection means without passing through an object. However, this feature was exceedingly well known in the art. For example, Jang discloses the steps of discriminating, in a radiation image, an area where X-rays are directly irradiated on an X-ray detection means without passing through an object, as a passing-through area (col. 2, lines 13-18. Note that the “background” is interpreted as the passing-through area). Jang further discloses an object discriminating step, of discriminating an area obtained by eliminating the area discriminated as the passing-through area in the discriminating step from the

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radiation image, as an object image [col. 12, lines 29-53. Jang explains that an object image is obtained based on Rules 5 and 6, wherein $F(x,y)=1$ indicates the body part, and $F(x,y)=0$ indicates the background, see col. 12, lines 36-39 and figure 4f. Note that setting $F(x,y)=0$ for the background is interpreted as being analogous to eliminating the area discriminated as the passing-through area].

Kido and Jang are both concerned with processing digital radiation images. Kido is concerned with performing gradation processing in accordance with only the significant regions of the image, in order to avoid inappropriate processing of the image data (Kido, col. 2, lines 1-17). Jang's teachings eliminate these adverse effects, and allows the parameters of the image processing algorithms used to further process the image to be calculated easily and set to their optimum values, leading to improved diagnostic utility and high image quality (Jang, col. 5, lines 29-41). Therefore, it would have been obvious to modify the discriminating steps of Kido, in view of Jang's teachings, in order to improve the diagnostic utility of the system and provide a high quality image.

Referring to claim 2, Kido fails to explicitly disclose the step of binarizing the object image. However, this feature was exceedingly well known in the art. For example, Jang discloses binarizing the object image (col. 12, lines 49-53 and figure 4f). Therefore, it would have been obvious to combine the teachings of Kido and Jang for the reasons stated above (claim 1).

Referring to claim 6, Kido further discloses photographing a thoracic vertebrae (col. 14, line 62 and figure 14d). Although Kido does not explicitly include photographing a cervical vertebra, it would have been obvious to photograph a cervical vertebrae instead of a thoracic

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vertebrae, since both a cervical and thoracic vertebrae are parts of a human body that are commonly X-rayed for medical diagnosis purposes.

Referring to claim 7, Kido further discloses extracting a pixel value characteristic (histogram) from the area (lung field region), and performing a gradation conversion processing of the radiation image based on the pixel value characteristic (col. 2, lines 1-4).

Referring to claim 16 and 19, see the rejection of at least claim 1 above.

Referring to claim 34 as best understood, Jang further discloses calculating a value $[Th(p,q)]$ representative of the passing-through area, and discriminating pixels equal to or higher than the calculated representing value and pixels within a certain distance from other pixels, as the passing-through area (col. 11, lines 43-44 and col. 12, lines 1-3 and lines 39-53).

Referring to claim 38, see the rejection of at least claim 1 above. Kido further discloses an X-ray radiation unit (1), adapted to radiate X-rays and a sensor (3), adapted to convert X-rays irradiated by the X-ray radiation unit into a radiation image signal (col. 7, lines 5-25 and figure 4).

8. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kido et al., U.S. Patent No. 5,732,149 ("Kido") and Jang et al., U.S. Patent No. 5,268,967 ("Jang"), in view of Kanebako et al., U.S. Patent No. 5,680,471 ("Kanebako").

Referring to claim 3, Kido and Jang fail to explicitly disclose the step of obtaining a weighted image by weighting the object image with its pixel value.

Kanebako discloses a weighting processing that is performed based on a pixel value of the image (col. 11, lines 5-13).

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Therefore, since Kido, Jang, and Kanebako are all concerned with extracting an area from a photographed X-ray image, it would have been obvious to modify the teachings of Kido and Jang, to include the weighting processing as taught by Kanebako, in order to extract an area based on the threshold that is determined by the weighting processing (Kanebako, col. 11, lines 5-10 and lines 29-30), thereby improving the extraction of this area from the background.

Referring to claim 4, see the rejection of at least claim 3 above. Kanebako further discloses a weighting processing as described above (claim 3), that is performed based on coordinates (position) of the pixel value in the image (col. 14, lines 31-32).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kido et al., U.S. Patent No. 5,732,149 ("Kido") and Jang et al., U.S. Patent No. 5,268,967 ("Jang"), in view of Doi et al., U.S. Patent No. 6,011,862 ("Doi").

Referring to claim 5, Kido and Jang fail to explicitly disclose that the area is set based on the secondary difference values of the projection.

Doi teaches a step of setting an area of an image based on the secondary difference (derivative) values of the projection (profile) (col. 9, lines 45-60 and figure 7. Note that the ribcage edge points in figure 7 are interpreted as the area).

Kido, Jang, and Doi are all concerned with analyzing the pixel value characteristic of radiation images. Doi provides a simple and accurate method of determining the edges of the ribcage in the lung region of the image. Therefore, it would have been obvious to modify the teachings of Kido and Jang, so that the area is set based on the secondary difference values of the

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projection as taught by Doi, in order to improve the detection of the concerned regions in the radiation image, thereby enhancing the diagnosis process.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.


ck

January 14, 2004


AMELIA M. AU
SUPERVISORY PATENT EXAMINER
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